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DISSECT – DEVELOPMENT OF A SMALL SATELLITE FOR CLIMATE RESEARCH

Abstract

The University of Wuppertal, Research Centre Jülich and Technical University of Munich are developing a small satellite for climate research (DiSSECT). This paper focuses on its mission and the science payload. Based on the three unit CubeSat form factor, the payload consists of a small spectrometer for the observation of airglow, namely O2 atmospheric band emissions at 760 nm. These data are utilized to derive temperature data, and dynamical wave structures at the same time. Coupling processes initiated by waves in the middle atmosphere have increasing importance for the modeling of the climate system and represent one of the larger uncertainties in this field. To support new modeling efforts to resolve the wave fields, spatially resolved measurements of different wave patterns are needed. In this paper, two spectrometer designs for the observation of O2 atmospheric band emissions are discussed. These are a monolithic spatial heterodyne spectrometer (SHS) and a piezo-actuated Fabry-Perot interferometer (PFPI). Both, the SHS and the PFPI can be highly miniaturized. The SHS consists of a solid block and has no moving parts, which increases the reliability in orbit while allowing high precision measurement within a small volume. Both instruments have not yet been flown on a CubeSat and have high potential to increase the importance of small satellites for science missions. DiSSECT is intended as a pathfinder for future remote sensing CubeSat constellations.